

Supporting information

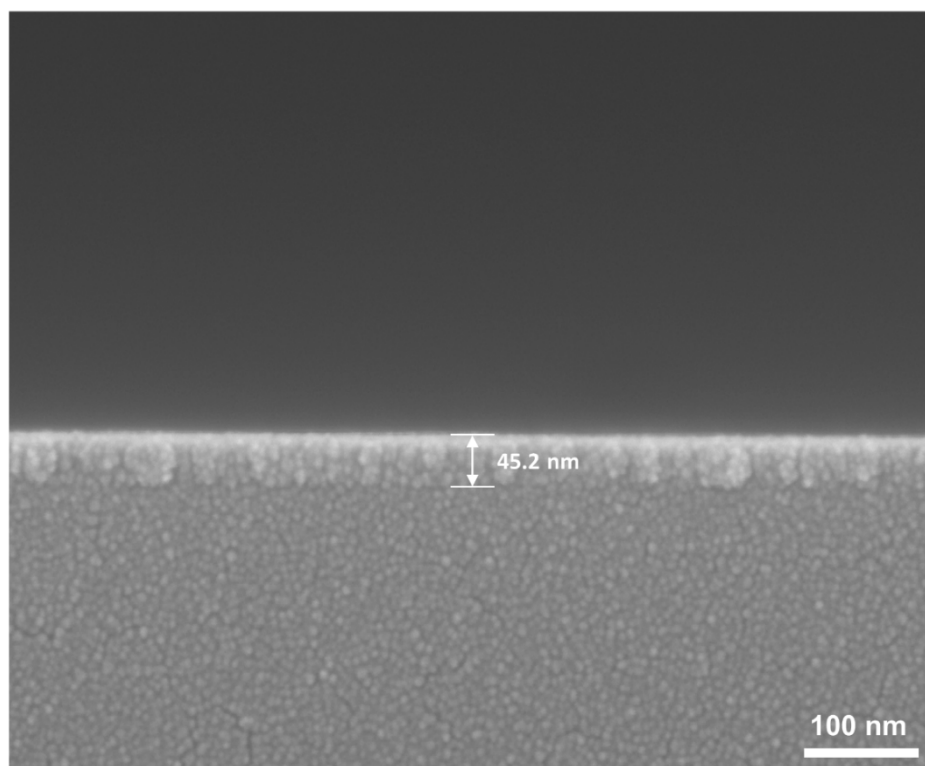


Figure S1. The FE-SEM image of the ITO thin film on Si/SiO₂ substrate.

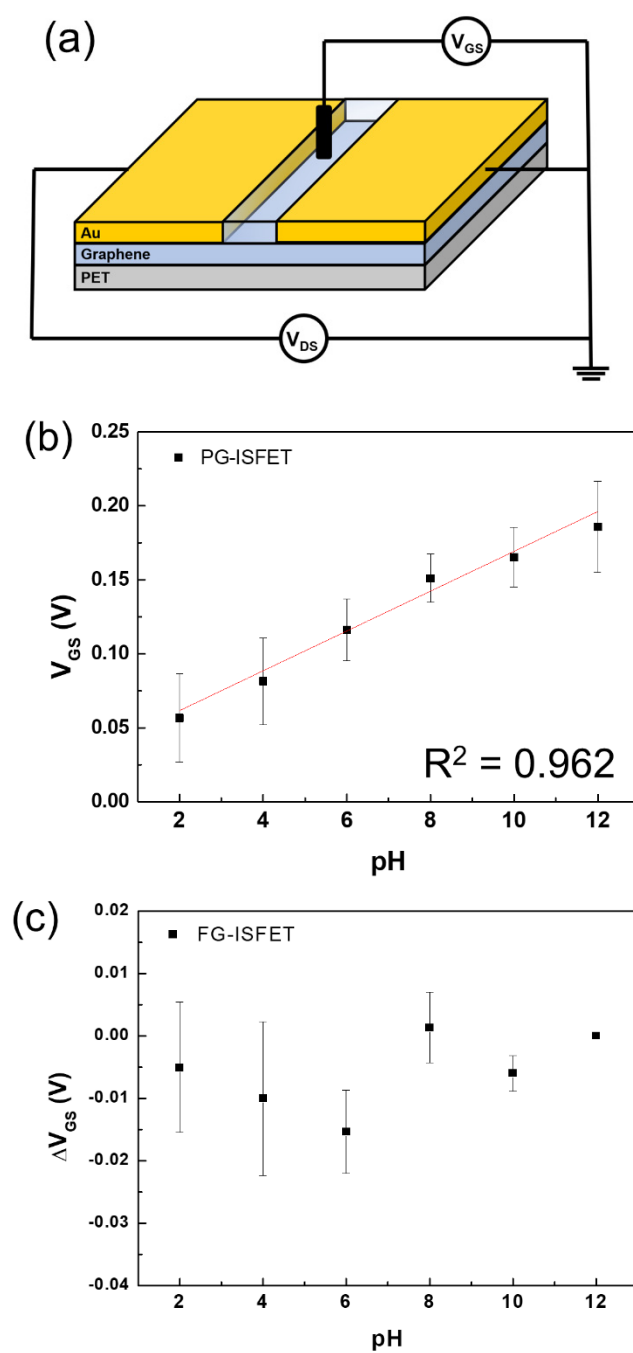


Figure S2. (a) Schematic diagram of the experiment. pH sensitivity of (b) the pristine graphene ion sensitive field-effect transistor (PG-ISFET) and (c) fluorinated graphene ion sensitive field-effect transistor (FG-ISFET) with Ag/AgCl RE in the pH buffer solution.

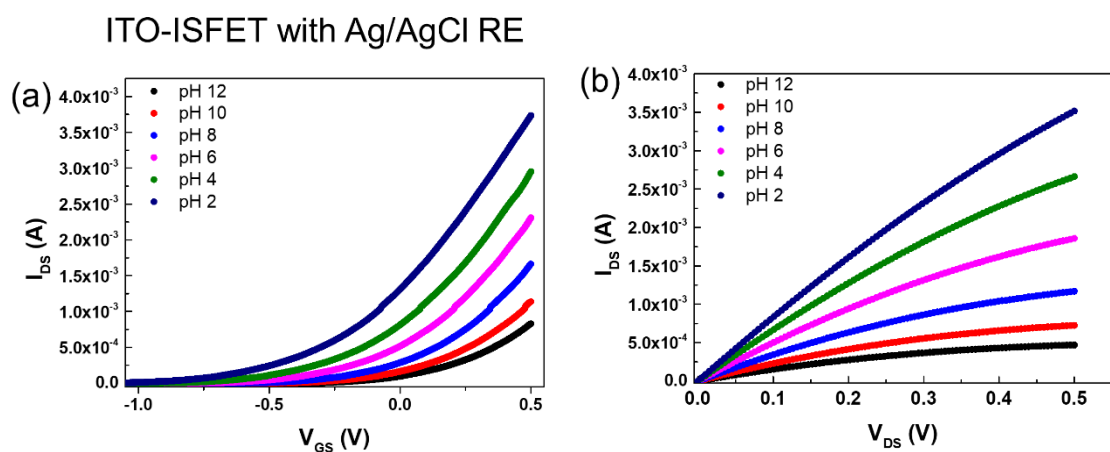


Figure S3. I_{DS} - V_{GS} and I_{DS} - V_{DS} transfer characteristics of the ITO-ISFET with Ag/AgCl RE in the pH buffer solution.

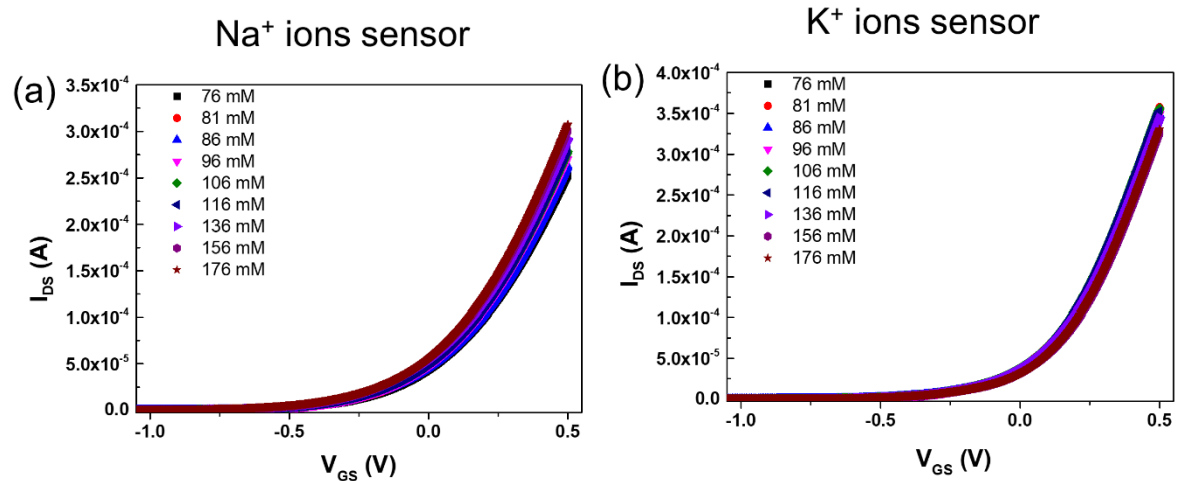


Figure S4. Detection of Na⁺, K⁺ ions using ITO-ISFET-ISM with F-rGO RE sensors in patient urine samples with varying Na⁺ ion concentrations. The sensitivities of Na⁺ ion sensor (a) and K⁺ ion sensor (b).

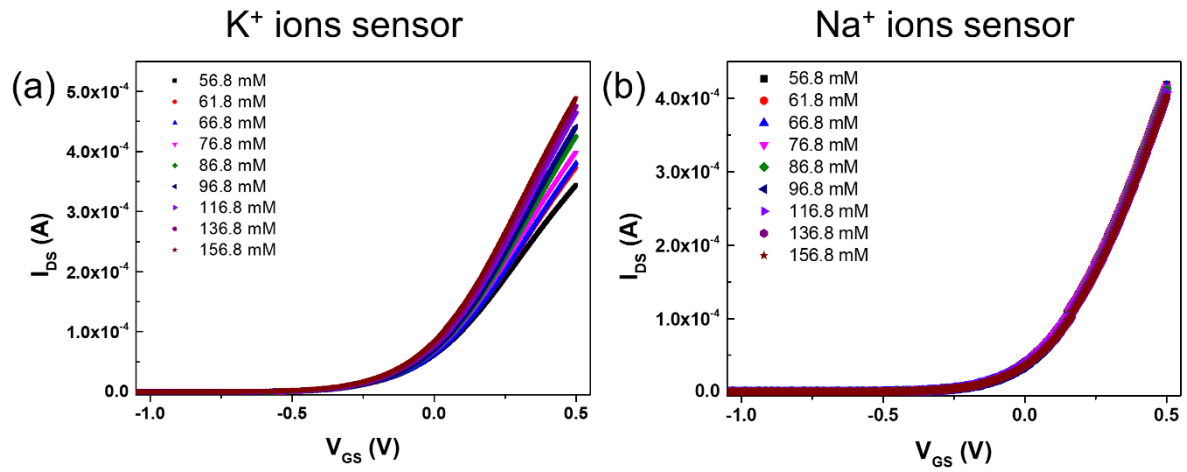


Figure S5. Detection of Na⁺, K⁺ ions using ITO-ISFET-ISM with F-rGO RE sensors in patient urine samples with varying K⁺ ion concentrations. The sensitivities of K⁺ ion sensor (a) and Na⁺ ion sensor (b).

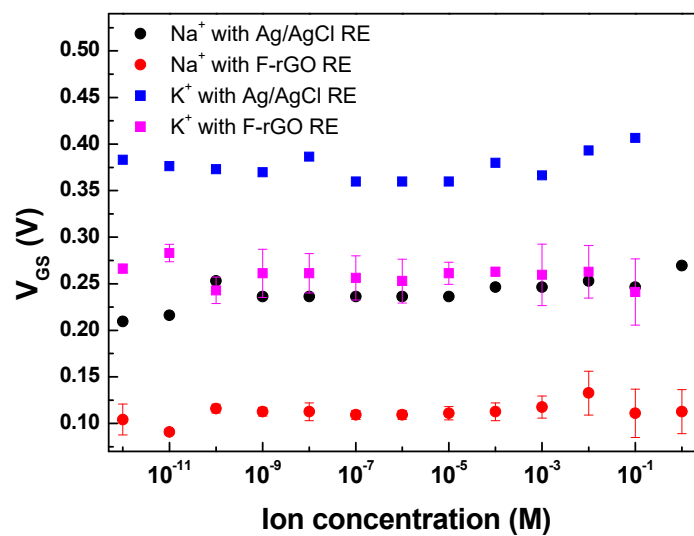


Figure S6. The Stability comparison of Ag/AgCl reference electrode and F-rGO reference electrode in solution A and solution B.